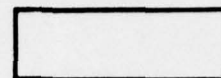


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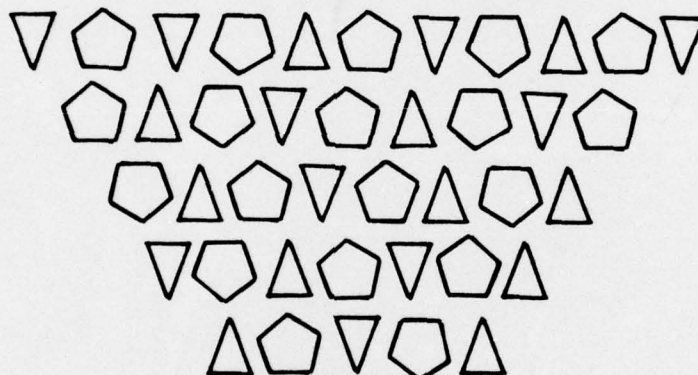
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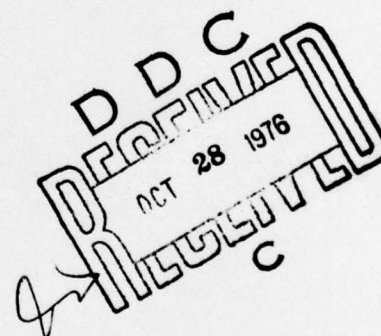
Presidential Address to the
Military Psychology Division of the
American Psychological Association,
September 1976

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Arthur J. Drucker



October 1976



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20. ~~2~~ also indicated a need for reassessment of current practices of product utilization and a need for the development of methods of tracking, identifying and measuring utilization of research and research products.

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Research Problem Review 76-15

MILITARY RESEARCH PRODUCT UTILIZATION

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October 1976

FOREWORD

Congressional scrutiny of RDT&E services has resulted in certain reappraisals of long-held concepts and practices concerning the utilization of military research products in the human resources area. In 1975 and 1976 the General Accounting Office (GAO) conducted extensive inquiries among the personnel and training laboratories of the Army, Navy, and Air Force to determine whether and to what extent the products of their research were being utilized. Human resources scientists realized almost immediately that considerable cooperation was required to define terms and develop methodology in order to examine these issues. What came out of these cooperative efforts were the beginnings of some better understandings of what constituted products and utilization in the human resources area.

An attempt at formalization of these understandings and of some useful definitions was made by Dr. Arthur J. Drucker, President of Division 19 (Military Psychology) of the American Psychological Association, in the period 1975 to 1976. Dr. Drucker selected as the subject of his Presidential Address the timely problems of conceptualizing, defining, and effecting product utilization, with the intent of presenting to his colleagues the current state-of-the-art of research product utilization. The widespread interest and response generated by his address has resulted in its presentation as the present ARI research problem review.



J. E. UHLANER,
Technical Director

MILITARY RESEARCH PRODUCT UTILIZATION

BRIEF

Requirement:

To survey U.S. military research product utilization and implementation in human resources RDT&E and determine whether any generalization of concepts and practices among researchers and users on the subject of product utilization can be made.

Procedure:

A 16-item open-ended questionnaire was informally circulated among 79 Department of Defense users and military sponsors and among 104 researchers in the Army, Navy, and Air Force, universities, and contractor firms. Responses received from 19 users and military sponsors and from 48 researchers were tabulated and otherwise summarized to provide a basis for generalization.

Findings:

Researchers and users differed in their definitions of "utilization." Researchers tended to define utilization in terms of use and change, users in terms of cost savings and improved effectiveness. Both users and researchers agreed that research products consist of much more than publications and reports. They generally agreed that the most successful method of insuring that the user uses the product properly is to "stick around and see that he does." The idea of a "utilization batting average" was unpopular, although a few respondents suggested simple formulas for responding to inquiries from Congressional Committees on quantity of research utilized. Utilization is considered very important in program evaluation, particularly for Advanced Development products; it may not be important or relevant for Basic Research products. There was general agreement that the researcher should assume partial responsibility for product utilization, officially or otherwise. Cost-effectiveness evaluation is important but is not widespread among RDT&E activities in the human resources area.

Utilization of Findings:

These findings provide preliminary information for budget and program managers for use in the translation, implementation, and tracing of human resources military research products into operational use and during that use.

MILITARY RESEARCH PRODUCT UTILIZATION ¹

For many years human factors researchers in the military R&D community had difficulty getting much attention. Now, it seems almost overnight, they are under the glare of spotlights directed by Congress, Secretaries of the various services, and certainly the Defense Department--all showing keen interest in R&D products of the human resources laboratories and looking for evidence that the research they have been underwriting all these years has led to products and discernible payoff. Congress enlisted the aid of GAO--the Government Accounting Office--for enlightenment on research utilization.

I don't know exactly what answers Congress wanted, but one of them must have been just how much human resources research leads to products. The personnel and training laboratories received inquiries on research product utilization to which many of them had problems responding, in some cases because they couldn't agree on the definition of "product," let alone what was meant by "utilization" of that product. It was not surprising to learn that some of the conclusions drawn on utilization were not very encouraging for human resources research efforts. For example: Having performed a utilization count among researcher-designated users of the publications of one R&D laboratory in the human resources area, a GAO official concluded that only 19% of the users of "40 reviews, reports, memoranda, papers, etc." reported utilizing the results. To GAO, reports represented the principal products of research; they also felt that "an entire [R&D] project should be application-oriented," and "users should be intimately involved in the whole process from selection and formulation of the problem to writing up the results, implementing the results, and evaluating that implementation" (Buesse, 1976). By implication, if the user was not using the product--that review, report, memorandum, or paper--researcher and user were not having nearly enough dialogue before, during, and after the research.

Nor did researchers get any sympathy from the Deputy Director for Research and Engineering (DDR&E). He also hit at the erratic interaction between human resources laboratories and potential users, implying that in some cases even the value of the best contributions was diminished by inadequate coordination with users. According to his office, the laboratories "are contributing significantly in some areas and not contributing in others either through their own fault or by virtue of circumstances beyond their control. In other cases this lack of appreciation is due to inadequate product marketing. A better marketing effort should be undertaken by these laboratories to assure not only that their current contributions are used, but also that the opportunities for making such contributions can be expanded" (White and Taylor, 1976).

¹Presented as the Presidential Address to the Military Psychology Division (Division 19) of the American Psychological Association at the APA annual meeting, 4 September 1976, Washington, D. C.

As I talked to small groups of Division 19 members, I found a great deal of enthusiasm for my suggestion that the R&D community should share experience and look at the problem of utilization together. Dr. Wallace Sinaiko was later to note: "I think we are long overdue to convene a meeting for the purposes of defining a continuous and serious effort in the utilization area. Let's start small and see what happens."

I did something like that. I started small and tentative. I recalled a saying from the good old days--my good old days, that is--that if you can't figure out a direct approach to the solving of a given problem, you should appoint a committee, or you should run a survey. Since, I'm told, no one has ever erected a statue to a committee, I ran a survey. (But you really can't get away from committees--in view of the nature of my survey sample I have to regard my respondents as a huge ad hoc committee. Eventually 67 people volunteered to serve on this committee, and my thanks go out to all of them.)

As I said in the survey transmittal letter, I hoped for some generalizations that could help the R&D community on the general subject of utilization and on better specific ways to prove we were spending the government's money responsibly. I sought the views of technical directors, project directors, users, and sponsors. I sent out 183 questionnaires--79 to users and sponsors, 104 to researchers. I had responses from 19 users and 48 researchers (Table 1)--most of them courteous and helpful. (Too helpful, if somewhat gratuitous, and also too late was the response of an Army user who blue-penciled my transmittal letter with the zeal of a first-year English professor.) Who responded? Let's look at Tables 2 and 3.

Table 1

QUESTIONS AND ANSWERS
USERS AND RESEARCHERS

	Mailed	Returned (% of Mailed)
Users	79 (43%)	19 (24%)
Researchers	104 (57%)	48 (46%)
	183 (100%)	67 (37%)

Table 2
WHO RESPONDED?
(POSITION IN R&D COMMUNITY)

In-House Research Directors	18
Program or Project Directors	15
Bench Scientists	4
Contract or Grant Monitors	3
Contractors and Grantees	8
Military Sponsors	12
Trainers	1
Other Military Users	6
	<u>67</u>

Table 3
WHO RESPONDED?
(ORGANIZATION AND FUNCTION)

Army Researcher	19
Army User	11
Navy and Coast Guard Researcher	12
Navy User	3
Air Force Researcher	6
Air Force User	5
Contractor and Other	11
	<u>67</u>

A larger proportion of researchers than users responded, the researchers being generally at upper echelons of their research organizations. In both cases we probably see significant experience with research as a necessary basis for replies. User representatives tended to be military and to rotate to different kinds of assignments. The larger number of Army respondents quite frankly reflects the larger number of Army contacts I had at hand.

Beyond those figures I was not much interested in tabulating the responses. Mainly I kept the responses as raw data--in some cases, raw remarks--but they were mostly sincere and conscientious, and I believe that respondents were convinced that what they had to say was important to understanding the research process.

While most respondents implied that military research could be improved in one or more aspects of product utilization, user and researcher indulged in charges and countercharges as to what is wrong with research and the utilization of its products, despite the growing frequency and duration of their dialogues.

One Army user was friend and critic: "In-house researchers need training as consultants if they ever expect to make progress with the decision-makers. Too many act as if they are in an ivory tower and shroud themselves in buzzwords and then wonder why their funds, etc. are cut and their products aren't used or appreciated."

Another Army user, on the other hand, jabbed at research requirements people. He said, "Most research I have seen has been the result of someone looking for a crutch or a polite way of putting off a hard decision."

Still another Army user: "If utilization within the Army is to be improved, reports must identify specific utilization actions and must be produced faster to improve timeliness. All sponsor-user organizations must have at least one professionally qualified individual within their staffs to coordinate the research and to direct utilization of research products."

And a user from the Air Force: "Too much military research is unsolicited or useless for operational decisions. This is what gives it a bad name."

An Army researcher replied: "Today utilization seems to drive all R&D, but utilization also means the user needs to be effective, not just the researcher," while a Navy researcher was conciliatory: "I think there is a learning curve in which the R&D organization and the user organization learn to work with one another."

"But," retorts an Army user, "practically every research product I have ever seen recommended further research or study."

Dr. Bernard J. Fine and Mr. R. P. Thorpe, Army and Navy researchers, respectively, go to considerable lengths to identify with the user.

Dr. Fine: "It is one thing to have a user come to you with a specific problem and work with you toward its solution. It is quite another to attempt to establish a relationship based on a somewhat vague promise that the research results may ultimately be of great use. It may be an extremely important area, worthy of the user's support, but in the Army, at least, very few of the users are so oriented. So research on, say, human behavior under stress, goes on, yielding sometimes interesting and potentially useful information if fully exploited; but (it) gets lost in the annual report, etc., and very rarely makes it to the doctrine level."

Mr. Thorpe: "My personal belief is that an applied R&D organization exists only to help meet the objectives of its parent organization. To do this, its products must be utilized; if the "state-of-the-art" is also advanced, so much the better. But having an impact on the parent organization should be the paramount objective."

And yet I am sure military users will agree that scientific research is necessary and will eventually be used. One researcher summarized: "You hope that all good basic research will eventually be used. If all (or nearly all) of your basic research is being used immediately, you are probably not taking enough chances. Not 'lack of use' but 'lack of imagination, etc.' are the crimes in basic research."

From these data we can see there is substantial difference in the postures taken by researchers and users. The opinions expressed were real and heartfelt. Researchers and users have different conceptualizations, different perceptions and definitions, when it comes to utilization, implementation, and products. Some sorting out seemed called for.

What are or what should be the prerogatives of the researcher on the one hand and the user on the other? Perhaps the questions and answers can give a clue. I asked, near the start of my questionnaire, "What do you mean by the term 'utilization of research' or 'utilization of research products' in the context of human resources R&D?" (Table 4). Ask an open-ended question, you get an even more open-ended answer. From the responses of the 46 researchers I heard from, utilization means changes in the way things are done. They insisted that research, even basic research done under 6.1 budget money, is designed to have discernible impact on the world; i.e., we do not pursue knowledge for its own sake. I have listed contrasting key words and phrases of researchers and users, but I'll give a few of the user responses in full:

Table 4

WHAT DO YOU MEAN BY THE TERM 'UTILIZATION OF RESEARCH' OR
'UTILIZATION OF RESEARCH PRODUCTS' IN THE CONTEXT
OF HUMAN RESOURCES R&D?

<u>Researchers</u>	<u>Users</u>
Operational Use of Product	Improve Effectiveness
Change--Mission Performance	Cost-effective Improvements
Incorporation of Product	Usable Information
Application--Knowledge	Benefit Decision-making
Adoption of Results	Provide User Requirements
Minimum Translation	Save Money
Options for Developmental Solutions	Application--Operational Evidence

"Application to conduct of current mission activities to achieve improved effectiveness" (Army user).

"Application of research to cost-effective improvements" (Air Force user).

"Research produces usable information or products that a) assist with 'real-world' problems, b) can be understood and/or applied by uninitiated researchers" (Army user).

"How, where, and why a research product is used to benefit decision-making at predetermined go/no-go point" (Army user).

"Result of a research effort used to aid in the decision process" (Air Force user).

"Measurement to judge probability for success and satisfaction so as to manage day-to-day decisions better" (Navy user).

"Use of research products to provide user requirements not obtainable by normal study process" (Army user). A sophisticated response, that.

"Use of research to save money" (Air Force user).

"Operational evidence of application" (Air Force user).

There appears to be substantial agreement between user and researcher that a research product is designed to effect a change. Were there differences between researcher and user? I conducted no formal content analysis, but some differences between researcher and user responses did strike me. If you'll allow me my subjective factor analysis--of response nuance--researchers talked in terms of implementation, use, application, change of procedure, policy. Users talked in terms of profit or gains, improved effectiveness, cost-effectiveness and money saving, problem solving, aids to better decision making and management. As a researcher I found this contrast very illuminating. As Fine and Thorpe intimated, perhaps researchers should take more notice of the user's view than they have.

Let's now leave utilization and talk of research products, if we can indeed separate the two. The question on products--"Which would, in your opinion, qualify as Research Products?"--gave away a little of the plot, but I wanted to determine the reaction of respondents to products they had possibly never considered before. This mind-expanding exercise is summarized in Table 5.

I found a tendency for the researcher to check more items as products than did the user; in fact, for each item, a greater percentage of researchers acknowledged that it qualified as a research product. Most notable differences between researcher and user were found in the items of training literature, handbook, report suitable for publication in a professional journal, any project report, recommendation for change in policy, SOP, policy manual. I am forced to speculate that the user does not give enough credit to research in helping him with his implementation of policy changes or may not accept that the researcher makes a contribution with such products as handbooks and manuals. At the same time, the user apparently is reluctant to regard the report as a product but almost universally accepts findings (data) and research tools as legitimate products.

Who is the user of our products? With what kinds of people do researchers need to interact in their efforts to effect the change implied by utilization? I asked my respondents: "Who, specifically, are the ultimate users of research products in your sphere of operations?" In general, responses followed the categories shown in Table 6. We can see that the user community is a broad one, ranging from troops in the field to policy makers.

In the attempt to focus respondents (both users and researchers) on actual cases, I asked them whether they had been involved in the implementation of a research product or products. Products thus selected by respondents included training, testing and evaluation of personnel, job standards, simulations, human engineering, physiological products, cultural change products. All in all, 56 separate products were reported.

Table 5

WHICH WOULD, IN YOUR OPINION, QUALIFY AS RESEARCH PRODUCTS?

Product	Percent Mentioning		
	Total	User	Rscher
Research Findings (Data)	85	84	85
Tests and Other Measurement Instruments	84	74	88
Research Tool	81	79	81
Training Program	79	74	81
Training Device	76	74	77
Training Literature (Manuals, Circ, Instructions)	76	53	85
Set of Guidelines	75	63	79
Recommendations for Change in Doctrine	73	63	77
New Technological Information	73	63	77
Handbook	73	47	83
Report Suitable for Publication in Prof Journal	70	47	79
Any Project Report	69	47	79
Data Banks	67	63	69
Technical Manual	67	58	71
Recommendations for Change in Policy	66	42	75
Job Aid, Information	63	47	69
SOP (Standing Operating Procedure)	46	26	54
Policy Manual	45	26	52
Research Material for University Level Education	42	21	50
Making the Researcher an Expert	39	21	46

Table 6

ULTIMATE USERS OF RESEARCH PRODUCTS

Systems Designers, Managers, Engineers, and Operators
General Staff
Training Officials
Social, Health and Educational Agencies
Personnel Officials
Members of the Scientific Community
Troops in the Field
Industry
Operational Test Designers
Policy Makers
Decision Makers
Planners

When I asked who took the initiative to get these 56 different products implemented, user and researcher did an Alphonse-Gaston act. Thirteen researchers and seven users claimed the user did, five users and six researchers said the researchers did, and fourteen said it was a joint activity. I concluded that, when it got down to cases, researcher and user did acknowledge the contribution of each other in implementation.

What factors motivated the user to want the product in the first place? The obvious answer was need of some kind, usually an operational need--for a training program, procurement decision, better classification, better goals and methods, better recruiting tools, evaluation of a course, reduction in cost of flying training, convincing the soldiers that a device was indeed useful, a method of training small units in tactics, universally accepted noise limits to use in designing aircraft, achieving high first-round hits on the TOW antitank weapon irrespective of range, improved symbology for presentation of computer-assisted displays in tactical data systems, changes in testing policy, compliance with new Government regulations, selection of midshipmen in such a way that 80 percent would voluntarily enroll as engineering or mathematics or science

majors, reduction of attrition costs, help with morale and job dissatisfaction problems. As you can see, the variety of needs as expressed is endless. But I can bring you no data on the validity of those needs or what challenges they imply for the researcher.

"What factors motivated the user to use the product" elicited not quite so many obvious responses (Table 7). Grouping and summarizing the responses may have hidden one thread of significance, which I call "faith or hope" on the part of the user that he's getting some help. Consider some of these individual comments by researchers:

Table 7

FACTORS THAT MOTIVATED THE USER TO USE THE PRODUCT

Recognized Worth of Product
Directive or Policy Decision
Confirmatory Evidence
Simplicity or Feasibility of Product
Persistent Strong Need for Product
Implementation Inherent in Research
Post-Research Reinforcement Activity
Confidence in Researchers and Scientific Backing
Government Requirement (i.e., In the Contract)
Persuasion
Miscellaneous--High Favorable Visibility of Research, User Support at Grass Roots, Contractor Claims, User Participation in Staffing

"User in constant state of 'management by crisis,' i.e., ready to give product a try."

"Product presented in form permitting adoption or adaptation."

"Because the results were so dramatic and potentially increased the effectiveness of current artillery weapons so much, the user could do nothing else but use the results."

"Once a decision had been made, it was necessary to follow through--so it was momentum."

"New data better than old."

"Persuasion by me."

"Operational tests showed that the model did what the user wanted it to do."

"Faced with high cost problem and convinced that technology could assist in reducing cost."

I had hoped to get, from this question, some idea how a product can best be sold, but, at least as the researcher views it, replies went all over the place. There are probably as many reasons for the user to be motivated to use a product as there are users--and products.

If one asks the question of utilization from a negative point of view, as GAO did, some clearer concepts emerge. GAO addressed the question only with respect to reports or publication-type products. "A number of possible causes of low utilization rate . . . noted by users were: lack of timeliness, lack of specificity of recommendations, lack of relevance to user problems, and too narrow a research scope Noted by the researchers were: lack of continuity of interest by sponsors, lack of user understanding of results, improper use of research end results, and lack of funding for implementation" (Buesse, 1976).

We have all experienced the frustrations of trying to utilize products, knowing that the actual point of utilization, particularly of 6.3 (Advanced Development) products, has had virtually no officially proper money, few personnel who can be legitimately assigned to utilization or implementation activities, and little acknowledged responsibility for seeing that a product gets used. Products have been known to get into the correct system nevertheless, but generally through ad hoc arrangements spurred by someone's conscience and with funding from who-knows-where.

I asked: "Did you get a user to use the product properly? What did you have to do?" (Table 8).

Table 8

HOW USERS WERE INFLUENCED TO USE PRODUCT PROPERLY

Active, Post-Research Activity (Usually Training)	22
Report, Documentation, Briefing Helped	9
User/Developer Agreement or Mutual Involvement	7
Directive	6
Vigilance	4
Persistent Persuasion	4
No, did not get them to use product properly	4
	<hr/> 56

One respondent replied: "By exposing them to it." I would question whether mere exposure is enough, except, perhaps, in those situations where a user is waiting impatiently with a "hope of success with it and fear of failure without it" attitude, or where it's a tool with face validity such as REALTRAIN. But in a climate of officer assignment turbulence when no one can recall who it was that had been enthusiastic about the product, or where a need is "overtaken by events," or where the implementing change is really going to upset things, or where a user must now do something he's afraid he will be criticized for not having done earlier as part of his job--in such cases, users may have to be pressured into using the product in any way, let alone properly.

If you will once more accept a frequency count from my 67 respondents, Table 8 suggests that the most successful way to get the user to use the product properly is to stick around and see that he does, particularly since, in our business, you have to drive out the old ideas with new ideas. It's not like introducing a new tank, where in all likelihood you won't have the old tank around except as an antique. You may have to send a man or a team to oversee the implementation or the training procedure. You may have to be a policeman or, as one respondent puts it, a crusader: "Make him a believer. Ask him to be 'change agent'; give him recognition for his services; encourage him to state any problems he may have in implementation."

One researcher recommends "sweet talk." Another tops that: "Demonstrate, advise, persuade, interpret, train, retrain, brief, and pray." In some cases the user may take extensive formal steps to effect optimal implementation to serve his political interests. For implementing the ASVAB (Armed Services Vocational Aptitude Battery) a 50-person group was organized to provide management with policies for correct use of the instrument, as well as a policy committee at DOD level, the Armed Forces Vocational Testing Group (AFVTG) for high school testing, and the Armed Forces Examining and Entrance Stations (AFEES) for testing the applicant for enlistment.

In my questionnaire I had asked for experiences in implementation. In the main, respondents emphasized success stories. Back in 1968, Dr. William McClelland listed the reasons "why products don't get implemented," sifted from among his organization's successes, by way of a scientific confessional (Table 9). Presumably this situation was typical of implementation practice at that time. Much of it is still to be found. Are we communicating the operational value of research any better today? Is the product available when projected? Is the operational or adopting structure the same as when the research began? How about continued support for the change at high echelons? Did anyone remember to get funds and personnel programmed for projected changes? Is the product in operationally usable form? Does proper doctrine exist to enable operational capability? Does someone still have to sell the product? (Dr. McClelland confesses that at one time his organization thought it wasn't the researcher's job to sell the product.)

Table 9

WHY PRODUCTS DON'T GET IMPLEMENTED
(FROM MCCLELLAND)

Poor Communication
Lack of Timeliness
Too Many Changes
Lack of Strong Command Support
Lack of Funds and Personnel
Lack of Engineering Capability
Policy Problem
Insufficient Salesmanship

If, from what I've reported so far, you get the impression that implementation is a hit-or-miss matter, you may be correct, but perhaps it won't be thus for long. A current service directive requires the implementing agency to request additional assistance from the developing agency in effecting implementation. There are two if's-- 1) if the developing agency has sufficient manpower available and 2) if the implementing agency has sufficient funds. Further, when the research effort has produced additional findings which the sponsor thinks have service-wide application, he is required, with assistance from the developer, to prepare a statement of methods by which the findings were put to use, with recommendations for gaining acceptance of the research product and for promoting the new procedures. Such a directive puts new responsibility on the sponsor for a very vital role in the implementation process, and in the R&D life cycle system, for that matter; it should bring the role of the user of software closer to that of the user of hardware.

I asked quantitative questions about problems in product utilization because everyone seems preoccupied with how much and what kinds of research should lead to full implementation. In the questionnaire, I asked: "How should a research organization determine its utilization batting average?"

Many respondents hemmed and hawed. Five researchers rebelled outright:

1. "A batting average is inappropriate The median or standard product may be more appropriate."
2. "This is an inappropriate concept. Generalizability is the measure of knowledge."
3. "Inappropriate. Return on investment is a better concept Counting reports is not related to productivity."
4. "Irrelevant question! The nation should understand R&D is essential to national survival, very risky and has few genuine payoffs, and is expensive."
5. "I don't know."

One summation of the problem is worth repeating: "Utilization by other researchers could possibly be measured by number of citations of articles in professional journals. But utilization in development is difficult because there is usually no clear thread or pathway. Research results are always combined with other findings or decisions, and their use is rarely acknowledged."

But for those who accepted my inquiries on scientific faith (or face), here is what the collective response appears to be (Table 10). Seven respondents suggested formulae or equations, such as "actual utilization of R&D products as a percentage of total R&D conducted," which most of them proposed in essence. But most of these proponents raised doubts as to the efficacy of their own proposals.

Table 10

HOW A RESEARCH ORGANIZATION SHOULD DETERMINE ITS
UTILIZATION BATTING AVERAGE

	Freq of Mention
Some Count of Customer Use	20
Predetermine Utilization (and hence indices of utilization)	12
A. Plan Each Research Product for Utilization	
B. Plan Documentation and Evaluation in Advance	
Consider Projects in 6.1, 6.2, 6.3 Budget Categories Separately	8
A. Different Products for Different RDT&E Research Categories	
B. For 6.1, Journal Acceptance Rate	
C. Did 6.2 move to 6.3?	
D. Hard to do--for 6.3 (Applied)	
Some Formula or Equation Involving Users, Importance and Other Variables	7
Analyze Products Before and After Implementation	4
Amount of Repeat Business	3
Documented Feedback	3
Number of Reports (with reservations)	2
Dollars Returned on Research Investment	1

My own reaction to the question of how a research organization should determine its batting average is that as long as Congress and GAO can ask questions implying the importance of some index of utilization quantity, the question is not an inappropriate one for human resources research to consider. But it is a most difficult one. How much utilization is adequate is not, as Dr. Wallace Sinaiko intimates, one that a Congress or a GAO should be allowed to establish--even by implication. We must, of course, consider research in 6.1 (basic research), 6.2 (exploratory development), and 6.3 (advanced development) budget categories separately. I would say, in 6.3 programs, if research proceeds efficiently and correctly, all products should be utilized or there should be readily understandable and acceptable reasons why not. In 6.2 programs, a fair percentage--arbitrarily, 50% of our efforts--should move to 6.3 research. If more than 50% moves to 6.3 programs, the research organization is probably not taking enough technical risk in its exploratory efforts. The category most difficult to evaluate is 6.1 research. Perhaps no consensus should be expected, as the organization itself is probably best qualified to evaluate 6.1 projects within its own environment.

One quantitative aspect of research product utilization that cannot be ignored is cost-effectiveness evaluation. Cost-effectiveness evaluation, it appears, is the name of a spectator sport most enjoyed by the budget makers and program decision makers and most feared by the researcher players. It is expensive and time-consuming and demands rigorous quantification on the criterion side when criteria are readily available--which they usually are not. But for the next few years or more, cost-effectiveness evaluation may be the most important or, even, the only game in town.

I asked: "If you conducted a follow-up evaluation of the effectiveness of the research product, how was it done?" "If it included a cost-effectiveness evaluation, what was the criterion used?"

Two traditional approaches to measurement of cost-effectiveness have been a) to examine alternatives, looking for that which gives the greatest benefit for a given cost, and b) to examine alternatives, looking for that which produces the required level of benefits at the lowest cost. The name of the game is to produce objective measures of user benefits. What I didn't specifically try to obtain was respondent experience in determining whether cost benefits were actually realized. Such cost-effectiveness information is difficult for most research organizations to get first hand, although at least one effort is now known that attempts to set forth guidelines for cost-effectiveness analysis in the training and education area. I refer to a recent report by the Naval Personnel R&D Center by Doughty, Stern and Thompson (1976).

In my inquiry, only 23 reported that some kind of follow-up evaluation of the effectiveness of their research product had been done (Table 11). Even fewer described a cost-effectiveness evaluation criterion. In fairness, I must say I had not asked respondents for their total or best experience on follow-up evaluation or cost-effectiveness evaluation--only that experience pertaining to the product they chose to discuss.

Table 11

HOW WAS THE FOLLOW-UP EVALUATION CONDUCTED?

	Times Mentioned
Researcher/User Agreement or Continued Contact	6
Collection of Data Bases	3
Further Research--Usually Validation	3
Evaluation Form in Report for Readers/Users	3
Monitoring Engineering and Operational Tests of the System	1
Development Manual and Validation Procedure (SQT)	1
Criterion: Developers are able to follow the procedures	1
Before and After Performance Measurement	1
Attitude Survey of Trainees	1

Table 11 suggests that follow-up evaluation is most prevalent where researchers and users have agreed upon it or continue to be in touch with one another.

Few generalizations are possible with respect to the criteria used in cost-effectiveness evaluation. Table 12 presents a few suggested from the responses: for instance, training costs produce the same level of performance. Or firing accuracy is increased, while time and ammunition costs remain the same or are decreased.

Table 12

IF COST EFFECTIVENESS EVALUATION WAS INCLUDED,
WHAT WAS THE CRITERION?

Training Costs/Performance
Firing Accuracy/Time/Ammo Costs
Research Costs/Cost Avoidance
Accident Rate/Cost Savings

To the last question to be discussed from the questionnaire proper-- "What role, if any, should utilization play in program evaluation?"-- there was a high level of unanimity, summarized as follows:

1. Utilization is very important--

Especially for 6.3 or applied programs (laboratory survival might well depend upon it).

But also important for 6.2 programs.

Not important (and maybe not even desirable) for 6.1 programs.

2. But be patient--utilization may take several years.

3. And don't overlook the importance of negative findings.

I will sum up briefly and only in part: My original intention, expressed in the memorandum accompanying my questionnaire, was to seek-- for human resources researchers--areas of consistency in their dealings with the people who can influence R&D budgets. I asked:

"Under what circumstances, if any, is the research report a proper and adequate product for R&D effort?" I think the views I received are fairly consistent--the consensus seemed to be "when talking 6.1 or, in many cases, 6.2 research." But conversely, the research report would appear to be inadequate as a sole product for 6.3 research. Additionally, even if it's an artifactual consequence of the questionnaire format, a list of all possible types of products was agreed to number between 1 and 20, and researchers named closer to 10-20 types.

"Should the researcher take any responsibility for product utilization?" The consensus here appears to be even stronger--yes, in fact, some kind of researcher participation is a necessity for product utilization. Additionally it would appear that everyone--user and researcher--is conscious of need for utilization if the research process is to be regarded as complete. I will go further. It is my impression that the most successful utilization involves the cooperative effort of the researcher and user to establish a mechanism or structure, on the order of the ASVAB structure, for effecting the changes required in using a new research product. Such mechanisms are not unknown to the services. The high-level user may have to beg, borrow, or steal services and resources--anything, at the beginning. At the very least, we have, in the AFEES, Reception Stations, and Depots for Tests, and in training development activities staffed by users, some mechanisms for effecting the changes a new research product requires to make life for the user easier than before.

Is it important to differentiate between utilization and implementation? A few respondents thought so. It's late, but I think it's about time to do so. To me, utilization is the broader term and can refer to actions

taken by researchers and users, and can be true of 6.1, 6.2, and 6.3 programs. Implementation implies a function generally performed by users, generally following 6.3 efforts, and generally not a formal part of the R&D life cycle as we know it in human resources research (although R&D people are frequently involved). A familiar and classical example is a personnel test validated through R&D efforts but, ideally, standardized through implementation procedures. Or, a prototype training course developed through R&D effort is utilized by training managers in the implementation process, i. e., generalized for widespread application or implementation, perhaps in a number of training locations. Or, researchers develop engagement simulation methodology as part of 6.1 and/or 6.2 effort, leading to a training model, which is then utilized by researchers to test doctrinal concepts as part of 6.3 research.

"How widespread is the practice of cost-effectiveness evaluation of research products?" The answer here has to be "not very," but many respondents intimated this practice must receive much more attention, starting immediately.

In everything I've discussed it has been very clear to me that improved utilization means new specialty roles for life cycle management in software. In fact, Dr. Bernard Rimland would have us go to Congress and say, "our valuable badly needed end products aren't being properly utilized, despite our efforts." Considerable additional funding and personnel resources will be needed to make these specialties a reality. Until these requirements are met more fully, I think we will continue to have utilization and implementation problems.

Finally, let me thank respondents for their conscientious thought and willingness to make a contribution to this important problem.

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